FRAME AND A.F. OUTPUT PENTODE

Pentode intended for use as frame output tube in television receivers and as A.F. power amplifier.

QUICK REFERENCE DATA				
Anode peak voltage	V_{a_p}	max.	2	kV
Cathode current	I_k	max.	100	mA
Output power	W_o		5.3	W

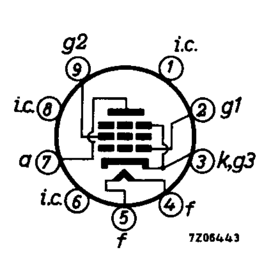
HEATING: Indirect by A.C. or D.C.; parallel supply

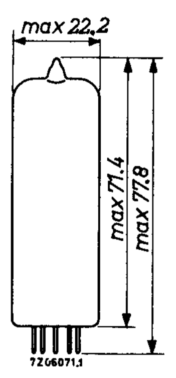
Heater voltage	V_f	6.3	V
Heater current	I_f	760	mA

DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval





CAPACITANCES

Anode to all except grid No.1	$C_{a(g_1)}$		6.8	pF
Grid No.1 to all except anode	$C_{g_1(a)}$		13	pF
Anode to grid No.1	C_{ag_1}	max.	0.6	pF
Grid No.1 to heater	C_{g_1f}	max.	0.25	pF

OPTIMUM PEAK ANODE CURRENT IN FRAME OUTPUT OPERATION

The circuit should be designed so that the peak anode current does not exceed:

145 mA at V_a = 60 V, V_{g_2} = 170 V, V_f = 6.3 V
190 mA at V_a = 70 V, V_{g_2} = 200 V, V_f = 6.3 V
220 mA at V_a = 80 V, V_{g_2} = 220 V, V_f = 6.3 V

The minimum available value of the peak anode current at end of life and V_f = 5.7 V is:

125 mA at V_a = 60 V, V_{g_2} = 170 V
160 mA at V_a = 70 V, V_{g_2} = 200 V
185 mA at V_a = 80 V, V_{g_2} = 220 V

OPERATING CHARACTERISTICS

A.F. power amplifier, class A (Measured with V_k constant)

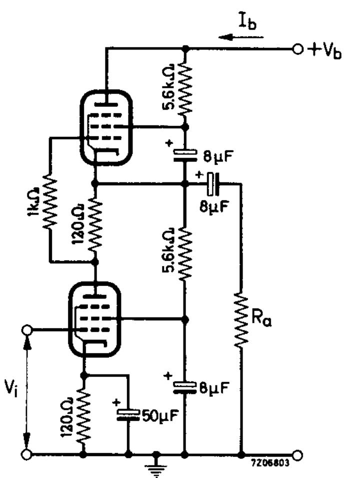
Supply voltage	V_b		200		V
Grid No.2 series resistor (non decoupled)	R_{g_2}		470		Ω
Cathode resistor	R_k		215		Ω
Load resistance	$R_{a\sim}$		2.5		kΩ
Grid No.1 driving voltage	V_i	0	0.52	7.0	V_{RMS}
Anode current	I_a	65	-	64	mA
Grid No.2 current	I_{g_2}	3.2	-	11.4	mA
Output power	W_o	0	0.05	5.3	W
Distortion	d_{tot}	-	-	10	%

A.F. power amplifier, class AB, two tubes in push-pull

Anode supply voltage	V_{ba}		250		V
Grid No.2 supply voltage	V_{bg_2}		200		V
Common cathode resistor	R_k		150		Ω
Load resistance	$R_{aa\sim}$		5.5		kΩ
Grid No.1 driving voltage	V_i	0	0.37	13.0	V_{RMS}
Anode current	I_a	2x50	-	2x55	mA
Grid No.2 current	I_{g_2}	2x2.0	-	2x13	mA
Output power	W_o	0	0.05	18.5	W
Distortion	d_{tot}	-	-	4.5	%

OPERATING CHARACTERISTICS (continued)

A.F. power amplifier, single ended push-pull



a) Single tone input signal

Supply voltage	V_b		300		V
Load resistance	$R_{a\sim}$		1		kΩ
Grid No.1 driving voltage	V_i	0	0.41	5.4	V_{RMS}
Supply current	I_b	66	–	64	mA
Output power	W_o	0	0.05	4.5	W
Distortion	d_{tot}	–	–	9.3	%

b) Double tone input signal

Supply voltage	V_b		300	V
Load resistance	$R_{a\sim}$		1	kΩ
Grid No.1 driving voltage	V_i	0	2.7	V_{RMS}[1])
Supply current	I_b	66	64	mA
Output power	W_o	0	5.5	W
Distortion	d_{tot}	–	8.5	%

[1]) Value of each tone separately.

REMARK

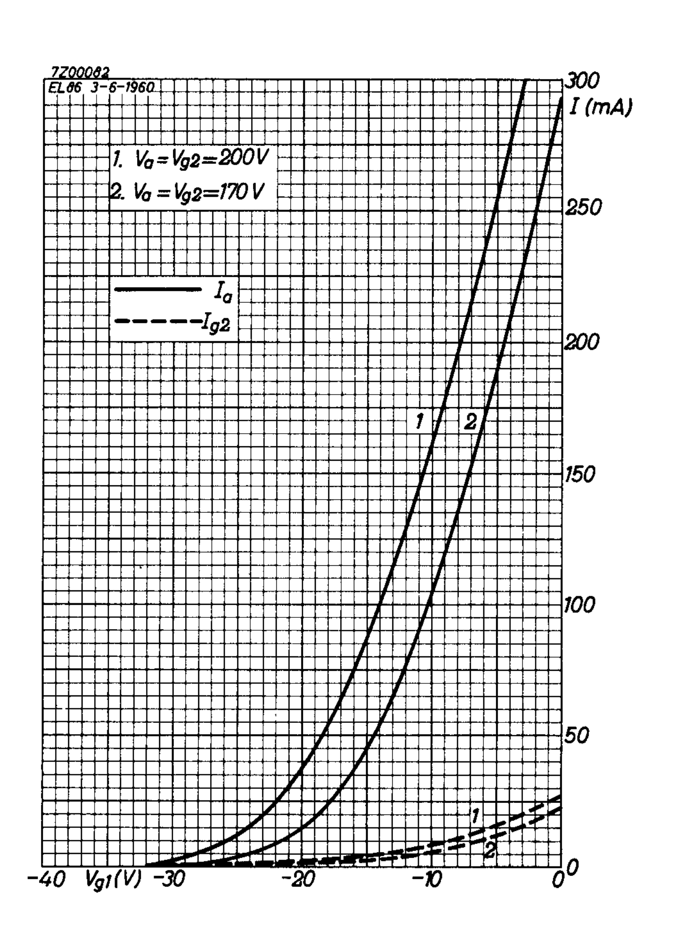
Single tone data are obtained with a pure sinusoidal input voltage. However such an input voltage is in general not representative for the reproduction of music and speech, since a purely sinusoidal tone seldom occurs.
The double tone data are obtained with two sinusoidal signals of different frequencies but of the same amplitude. This appears to be far better in agreement with practice. In the case of full drive with two sinusoidal signals different in frequency but having the same amplitude, the output power is half the value obtained at full drive with a single sinusoidal input voltage of twice this amplitude. To make comparison possible the obtained output power with double tone has therefore been multiplied by 2.

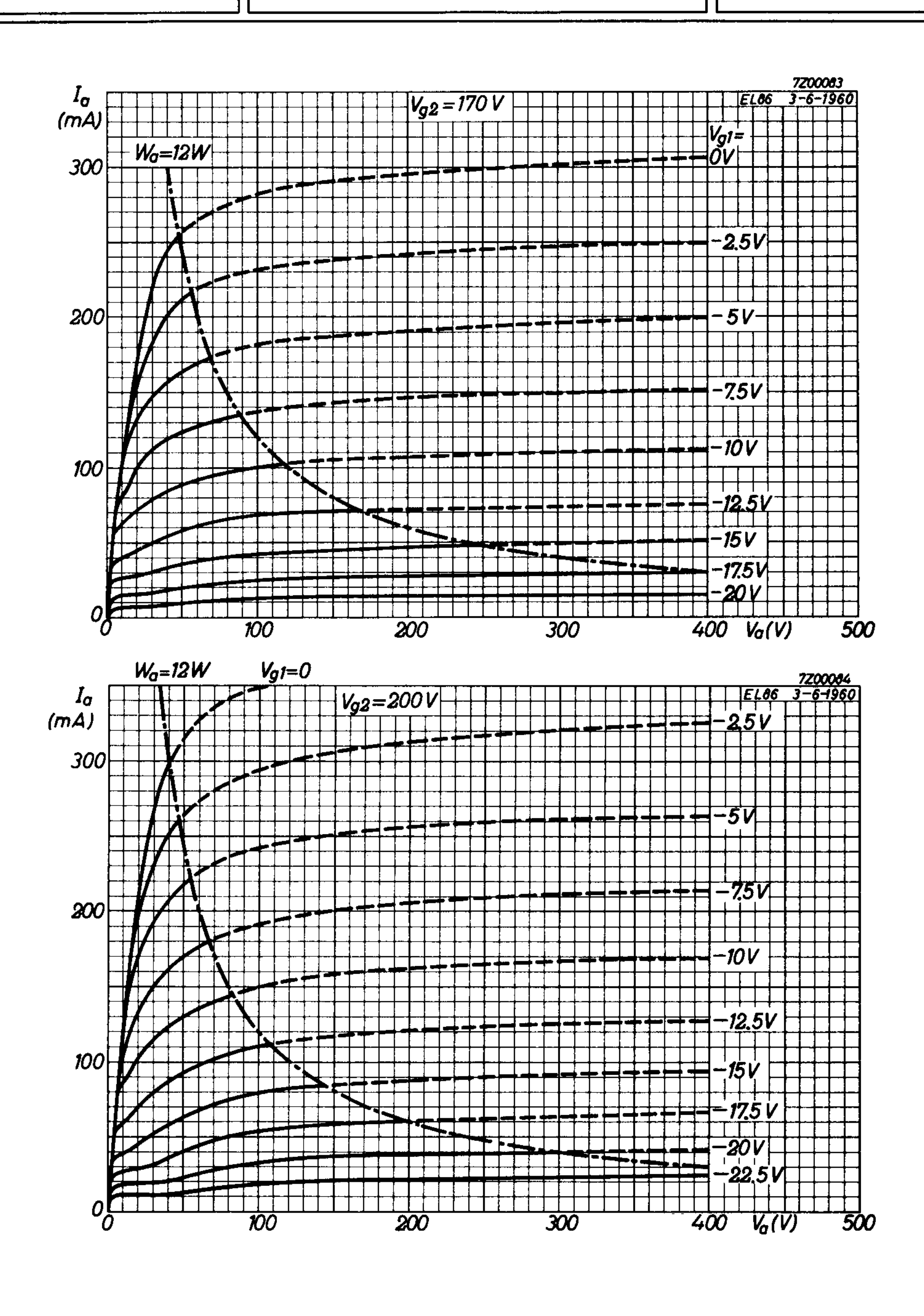
LIMITING VALUES (Design centre rating system)

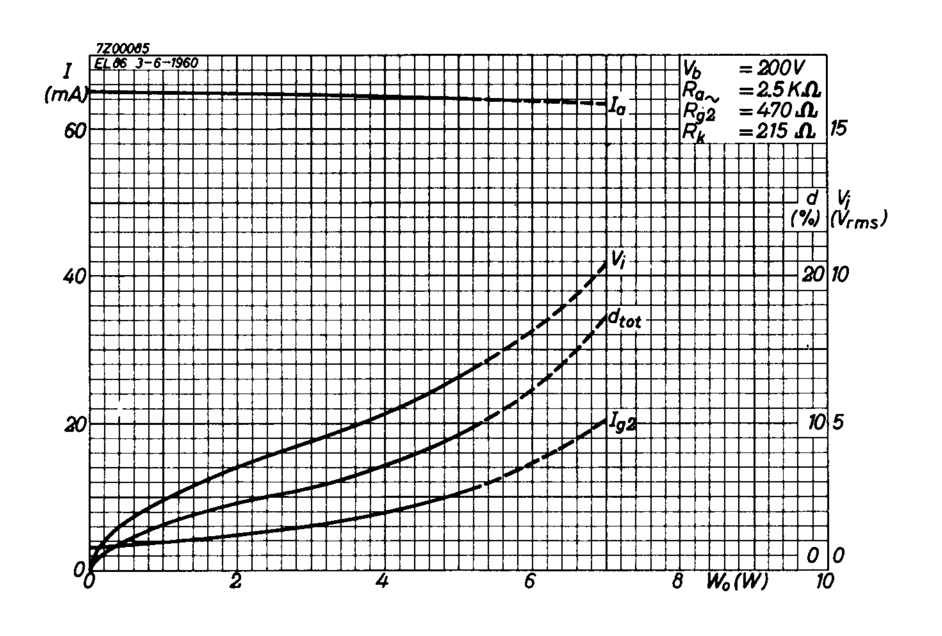
Anode voltage	V_{a_o}	max.	550	V
	V_a	max.	250	V
Anode peak voltage	V_{a_p}	max.	2	kV [1]
Grid No.2 voltage	$V_{g_{2o}}$	max.	550	V
	V_{g_2}	max.	250	V
Anode dissipation	W_a	max.	12	W [2]
Grid No.2 dissipation:				
average	W_{g_2}	max.	1.75	W
peak	$W_{g_{2p}}$	max.	6	W
Cathode current	I_k	max.	100	mA
Grid No.1 resistor:				
automatic bias	R_{g_1}	max.	1	MΩ
frame output application with automatic bias	R_{g_1}	max.	2	MΩ
Cathode to heater voltage	V_{kf}	max.	200	V

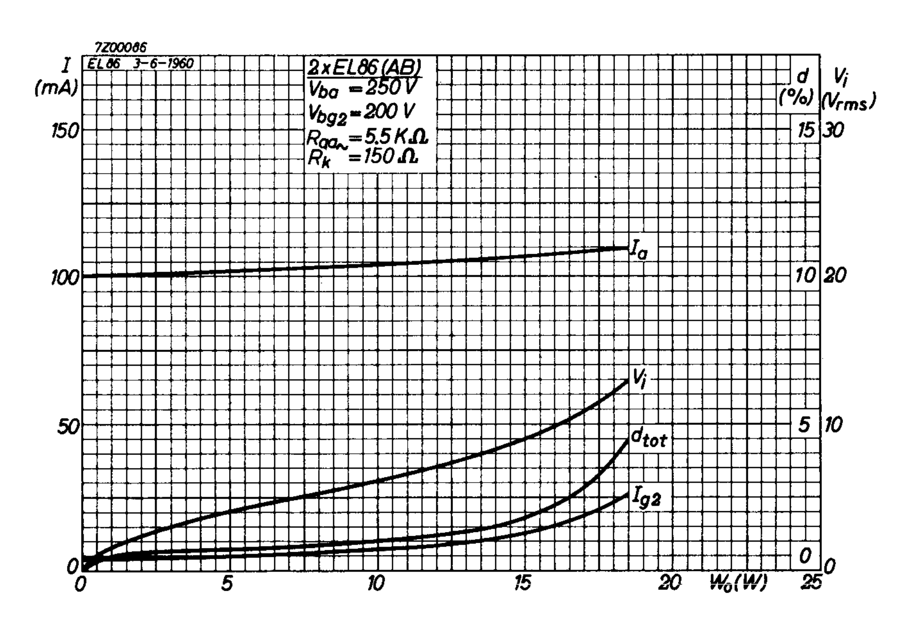
[1]) Valid for application in frame output circuits where the max. pulse duration is 4% of a cycle with a max. of 0.8 ms.

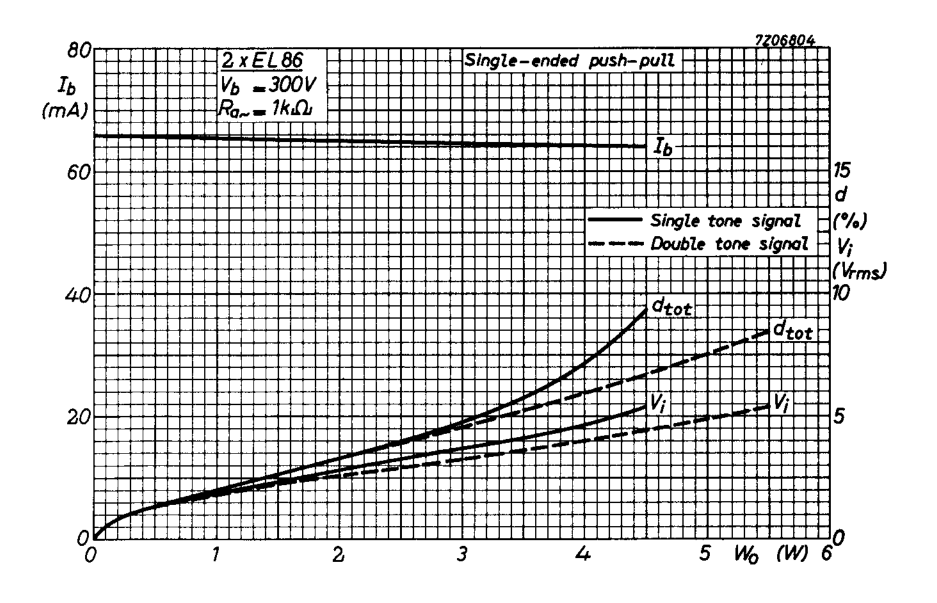
[2]) For frame output application W_a = max. 10 W.

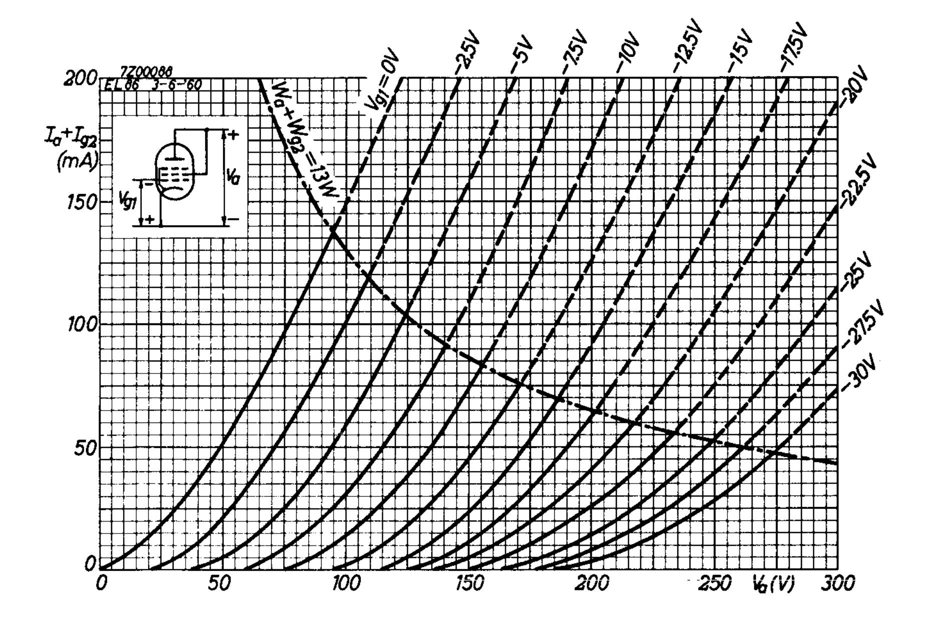

7Z00082
EL86 3-6-1960
1. $V_a = V_{g2} = 200V$
2. $V_a = V_{g2} = 170V$
I_a
I_{g2}
300
I (mA)
250
200
150
100
50
0
1
2
1
2
-40
V_{g1}(V)
-30
-20
-10
0

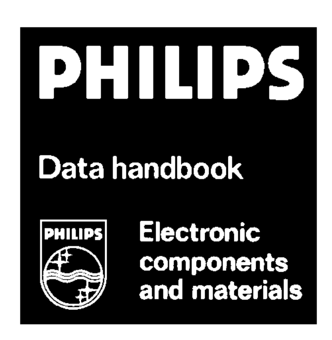

7Z00083
EL86 3-6-1960
I_a
(mA)
V_{g2}=170 V
W_a=12W
V_{g1}=
0V
-2.5V
-5V
-7.5V
-10V
-12.5V
-15V
-17.5V
-20V
300
200
100
0
0
100
200
300
400
V_a(V)
500
W_a=12W
V_{g1}=0
7Z00084
EL86 3-6-1960
I_a
(mA)
V_{g2}=200V
-2.5V
-5V
-7.5V
-10V
-12.5V
-15V
-17.5V
-20V
-22.5V
300
200
100
0
0
100
200
300
400
V_a(V)
500


7Z00065
EL86 3-6-1960
I
(mA)
V_b = 200V
$R_{a\sim}$ = 2.5 KΩ
R_{g2} = 470 Ω
R_k = 215 Ω
I_a
d
(%)
V_i
(V_{rms})
V_i
d_{tot}
I_{g2}
W_o (W)


7Z00066
EL86 3-6-1960
I
(mA)
2xEL86(AB)
V_{ba} = 250 V
V_{bg2} = 200 V
$R_{aa\sim}$ = 5.5 KΩ
R_k = 150 Ω
d
(%)
V_i
(V_{rms})
I_a
V_i
d_{tot}
I_{g2}
W_o (W)


7Z06804
2 x EL86
V_b = 300V
$R_{a\sim}$ = 1kΩ
Single-ended push-pull
I_b (mA)
I_b
Single tone signal
Double tone signal
d (%)
V_i (V_{rms})
d_{tot}
d_{tot}
V_i
V_i
W_o (W)


7Z00088
EL86 3-6-60
I_a+I_{g2} (mA)
V_{g1}
V_a
V_{g1}=0V
W_a+W_{g2}=13W
-2.5V
-5V
-7.5V
-10V
-12.5V
-15V
-17.5V
-20V
-22.5V
-25V
-27.5V
-30V
V_a(V)



EL86

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1	1	1969.01
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8	8	1969.01
9	FP	1999.03.19